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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,110	10/17/2001	Robert L. Gerlach	F077	9322

25784 7590 07/15/2003

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EXAMINER

EL SHAMMAA, MARY A

ART UNIT	PAPER NUMBER
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2881

DATE MAILED: 07/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/982,110

Applicant(s)

GERLACH ET AL.

Examiner

Mary A. El-Shammaa

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35-37 is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 10-16, 18-27 and 33 is/are rejected.
- 7) ☒ Claim(s) 6, 8, 9, 17-19, 28-32, 34 and 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Claim Objections

Claim 18 is objected to because of the following informalities: On line 1 of claim 18, the first word "A" should be changed to – *An* –. Appropriate correction is required.

Claim 19 is objected to because of the following informalities: On line 2 of claim 19, the phrase "an liquid metal ion emitter" should be changed to – *a liquid metal ion emitter* –.

Appropriate correction is required.

Claim 35 is objected to because of the following informalities: On line 4 of claim 35, the term –*isolation valve*– is missing after the word "in-vacuum". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5, 7, 18, and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Otaka et al. (5,324,950).

Regarding claims 1 and 26, Otaka et al. discloses in Figs. 1, 4, and 6 a FIB system including a system vacuum chamber (26); an ion gun including a liquid metal ion source (1); a plurality of lens elements (100) for extracting and focusing ions, one or more beam apertures;

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electrostatic deflection means (3, 4, 5); and one or more dielectric bushings (20, 27) for positioning one or more lens elements (4, 5, 6, 30) and for providing a sealable vacuum container for the one or more elements, the interior of the vacuum container (13) being vacuum selectively isolatable from the environment in the system vacuum chamber (Col 1, Line 48 through Col. 2, Line 36; Col. 3, Lines 1-7; Col. 3, Line 52 through Col. 4, Line 44; Col. 5, Line 38 through Col. 6, Line 42; Col. 7, Lines 1-22; Col. 10, Lines 10-20).

A detailed cross-sectional diagram of a semiconductor device assembly. At the top, there's a multi-layered stack with label 24. Below it is a large rectangular block 13. To the right of block 13, several curved and layered structures are shown, labeled 14-2, 28, 33, 15, 29, and 29-1. These are situated above a horizontal plate 26. Underneath plate 26, there's a central protruding part 6 on a base layer 7. Other labels include 32 and 31 near the bottom center, and 12 at the bottom right. A wiring system 300 originates from the bottom right, passing through components 302, 304, TMP, and RP, which are connected to the main assembly.

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Regarding claim 2, Otaka et al. discloses the dielectric bushing positioning and electrically isolating one or more components of an ion gun and in which the dielectric bushing forms a vacuum container for the ion gun (Col. 3, Line 65 through Col. 4, Line 56).

Regarding claim 5, Otaka et al. discloses the FIB column including a final lens and further comprising electrostatic steering electrodes between the gun and the final lenses (Col. 4, Lines 14-35; Col. 6, Line 68 through Col. 7, Line 28).

Regarding claims 7 and 27, Otaka et al. discloses the FIB system comprising and in-vacuum isolation valve mechanism (**28, 29**) (Col. 6, Lines 15-56).

Regarding claims 18 and 23, Otaka et al. discloses an ion gun dielectric bushing and a method of forming gun assembly for a focused ion beam column comprising a dielectric material formed to support and align multiple ion optical elements and to form a vacuum chamber surrounding those elements, the vacuum chamber including at least one opening for supplying electrical voltage to one or more of the multiple optical elements and the vacuum chamber being isolatable from a separate system vacuum chamber (Col 1, Line 48 through Col. 2, Line 36; Col. 3, Lines 1-7; Col. 3, Line 52 through Col. 4, Line 44; Col. 5, Line 38 through Col. 6, Line 42; Col. 7, Lines 1-22; Col. 10, Lines 10-20).

Regarding claims 24 and 25, Otaka et al. discloses providing a vacuum pump (**200, 202**) for evacuating the vacuum container formed by the dielectric housing and a vacuum isolation valve (**28, 29**) for isolating the dielectric housing (Col. 4, Lines 1-44; Col. 6, Lines 15-56).

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12-16, 19, 20, 22, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otaka et al. in view of Gesley (5,196,707).

Regarding claims 12, 16, 19, 20, 22, and 33, the ion gun of the focused ion beam system of Otaka et al. does not disclose an emitter assembly positioned within the gun chamber housing, the emitter assembly including a suppressor, an extractor and extractor aperture, and the optical elements being aligned with the emitter assembly. Gesley et al. discloses in Figs. 2 and 3 an emitter assembly positioned within the gun chamber housing, the emitter assembly including a suppressor, an extractor and extractor aperture, and the optical elements being aligned with the emitter assembly (Col. 6, Lines 39-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the emitter assembly of Gesley in the focused ion beam system of Otaka et al. because Gesley teaches that the emitter assembly shapes the field and reduces aberrations and allows for easy alignment of the mechanism (Col. 6, Lines 56-63).

Regarding claims 13-15, Otaka et al. discloses the ion gun and all of the associated elements being maintained in a vacuum and in which the dielectric housing provides the walls of the vacuum chamber, is surrounded by a metallic shield, and a vacuum isolation valve is actuatable to seal the ion gun (Col. 3, Line 65 through Col. 4, Line 56).

Claims 3, 4, 10, 11, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otaka et al. in view of Applicants' admitted prior art.

Regarding claims 3, 4 and 21, Otaka et al. does not explicitly disclose electrical wires penetrating the dielectric bushing of the FIB system. The Applicants disclose on page 3, paragraph [1007] of the specification having electrical wires penetrate the dielectric bushing and vacuum sealing the wires in the dielectric bushing using a fusing process, a brazing process, a glue, or O-rings. It would have been obvious to one having ordinary skill in the art at the time the invention was made to vacuum seal wires penetrating the bushing so as to maintain a high vacuum within the dielectric bushing.

Regarding claims 10 and 11, Otaka et al. does not disclose the FIB system comprising an in-vacuum aperture changing mechanism. The Applicants disclose on pages 2 and 3, paragraphs [1005, 1007] FIB systems having in-vacuum aperture changing mechanisms comprising one or more piezoelectric actuators, DC motors, or stepper motors for driving the stage. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include this aperture changing mechanism with the apparatus and system of Otaka et al. because this allows for changing of the aperture without disturbing the vacuum.

Allowable Subject Matter

Claims 35-37 are allowed. The following is an examiner's statement of reasons for allowance: Regarding claim 35, the prior art fails to teach or fairly suggest, in addition to the

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accompanying features of the claim, an isolation valve entirely within the vacuum, wherein there is no mechanical linkage from the valve to the outside of the entire contained vacuum system.

Claims 36 and 37 are allowed by virtue of their dependency.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claims 6, 8, 9, 17, 28-32, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (4,698,236).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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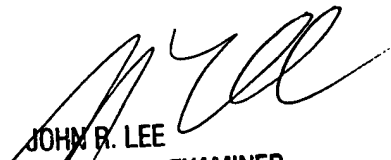
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary A. El-Shammaa whose telephone number is 703.308.0851. The examiner can normally be reached on M-F (8:30am-5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on 703.308.4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9318 for regular communications and 703.872.9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.872.9317.

mae
June 30, 2003


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800